

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) An analysing method ~~with a view to for~~ sorting products such as pieces of fruit which are transported along an axis (x) on a conveyer line having a plurality of rollers (3, 4) which are mounted so as to each rotate freely about a transverse axis of rotation orthogonal to the axis (x), and which are spaced apart in such a way that two adjoining rollers (3, 4) define, between them, a seating for a product, the said analysing method consisting in using analysing means which are split up into a number of successive stations (5, 6, 7) arranged at a distance from one another along the axis (x), and in causing the rollers (3, 4) to revolve about their axes of rotation between the stations (5, 6, 7) in such a way as to display, at each of the said stations, different faces of each product, wherein:

- three analysing stations (5-7) are arranged along the conveyer line, and each of the ~~said~~ analysing stations is equipped with at least one camera (8, 9, 12, 14) which is orientated and adapted to make, with an adjustable frequency, photographs of the products transported by the conveyer line,

- one of the said stations (5) having two cameras (8, 9) which are arranged on either side of the conveyer line in the same vertical plane orthogonal to the axis (x), and are orientated in such a way that their respective optical axes form a V which is centred on the said axis (x) and has a vertex angle substantially in the range between 90° and 130°,

- the other two stations (6, 7) each comprising a camera (12, 14) which is arranged plumb with the conveyer line and is orientated in such a way that its optical axis is vertical and secant with the axis (x),

- in a preliminary phase, there are determined the average diameter of the products to be analysed and, as a function of the said average diameter, a speed of rotation of the rollers (3, 4) which is adapted so that a product of average diameter which is located in the plane of a camera (8, 9) at the first station (5) and is caused to revolve on itself along the whole of the analysing means under the effect of the rotation of the said rollers, undergoes a rotation such that four complementary zones on its surface are viewed by the respective cameras (8, 9, 12, 14) of the first, second and third stations (5-7),

- and during the conveying of the products, the rollers (3, 4) are caused to revolve continuously at the predetermined speed of rotation, and for each product:

- m_i photographs of this product are made at the first station (5), where $i \geq 3$, n_j photographs at the second station (6), where $j \geq 1$, and p_k photographs at the third station (7), where $k \geq 3$,

- the theoretical diameter of the product is calculated from the photographs made,

- and, from the photographs made at the three stations, the individual photographs m_i , n_j and p_k from the three stations to be taken into account with a view to analysing the said product are determined by comparison of the theoretical diameter of the said product with the predetermined average diameter, in such a way as to obtain a complete analysis, without overlapping or with a given overlap, of the total surface of the said product.

2. (original) An analysing method as claimed in claim 1, wherein a speed of rotation of the rollers (3, 4) is determined which is adapted so that a product of average diameter undergoes a rotation on itself with an angle of rotation substantially in the range between 110° and 130° between the first and second stations (5, 6), and with an angle of rotation substantially in the range between 105° and 115° between the second and third stations (6, 7).

3. (currently amended) An analysing method as claimed in claim 2, wherein the stations (5-7) of analysing means are arranged in such a way that the distance between the first and second stations (5, 6) is substantially in the range between 1.1 and 1.2 times the distance between the second and third stations (6, 7), and the rollers (3, 4) are caused to revolve in rotation at a constant speed of rotation along the whole of the ~~said~~ analysing device.

4. (previously presented) An analysing method as claimed in claim 1, wherein a speed of rotation of the rollers (3, 4) is determined which is adapted so that a product of average diameter undergoes a rotation on itself with an angle of rotation substantially equal to 125.5° between the first and second stations (5, 6), and with an angle of rotation substantially equal to 109° between the second and the third stations (6, 7).

5. (previously presented) An analysing method as claimed in claim 2, wherein the distance between the first and second stations (5, 6) is substantially equal to 1.15 times the distance between the second and third stations (6, 7).

6. (previously presented) An analysing method as claimed in claim 2, wherein the cameras (8, 9) of the station (5) comprising two cameras are arranged in such a way that their respective optical axes define a V with a vertex angle substantially equal to 109°.

7. (previously presented) An analysing method as claimed in claim 1, wherein the first station (5) is equipped with two cameras (8, 9), and the second and third stations (6, 7) with one camera (12, 14).

8. (currently amended) An analysing method as claimed in claim 1, wherein three photographs of each product are taken by each camera at the first and third stations (5, 7), and a single photograph of the said products is taken by each camera at the second station (6).

9. (currently amended) An analysing device ~~with a view to for~~ the automatic sorting of products ~~such as pieces of fruit,~~ the said device comprising:

- a conveyer line for transporting the products along a longitudinal axis (x), the said line having a plurality of rollers (3, 4) which are mounted so as to each rotate freely about a transverse axis of rotation orthogonal to the axis (x)

and are spaced apart in such a way that two adjoining rollers (3,
4) define, between them, a seating for a product,

- means for analysing the surface of the products,
which means are arranged above the conveyer line and have a
number of successive stations (5-7) arranged at a distance from
one another along the axis (x),

- means (20) for driving the rollers (3, 4) in rotation
about their axes of rotation, which means are suitable for
bringing about rotation of the said rollers between the analysing
stations (5-7) in such a way that different faces of the products
are analysed at each station,

- and a processing unit adapted to receive information
emanating from the analysing means, and to calculate workable
sorting data from predefined, programmed criteria,

wherein:

- the analysing means comprise three analysing
stations, each of the said analysing stations (5-7) having at
least one camera (8, 9, 12, 14) which is orientated and adapted
to make, with an adjustable frequency, photographs of the
products transported by the conveyer line,

- one of the said stations (5) having two cameras (8,
9) which are arranged on either side of the conveyer line in the
same vertical plane orthogonal to the axis (x), and are
orientated in such a way that their respective optical axes form

a V which is centred on the ~~said~~ axis (x) and has a vertex angle substantially in the range between 90° and 130° ,

- the other two stations (6, 7) each comprising a camera (12, 14) which is arranged plumb with the conveyer line and is orientated in such a way that its optical axis is vertical and secant with the axis (x),

- the means (20) for driving the rollers (3, 4) in rotation are arranged in such a way as to bring about continuous rotation of the ~~said~~ rollers along the analysing means, at a speed of rotation which is adapted so that a product of predetermined average diameter which is located in the plane of a camera (8, 9) at the first station (5) and is caused to revolve on itself along the whole of the analysing means under the effect of the rotation of the ~~said~~ rollers, undergoes a rotation such that four complementary zones of its surface are viewed by the respective cameras (8, 9, 12, 14) of the first, second and third stations (5-7),

- the processing unit is adapted to:

- process, for each product, m_i photographs of the ~~said~~ products taken at the first station (5), where $i \geq 3$, n_j photographs taken at the second station (6), where $j \geq 1$, and p_k photographs taken at the third station (7), where $k \geq 3$,

- and to determine, by a comparison of the theoretical diameter of this product with the predetermined average diameter,

from the photographs made at the three stations, the individual
~~mi, nj and pk~~ photographs from the three stations to be taken
into account with a view to analysing the said product, in such a
way as to obtain a complete analysis, without overlapping or with
a given overlap, of the total surface of the said product.

10. (original) An analysing device as claimed in claim
9, wherein the first station (5) has two cameras (8, 9), the
second and third stations (6, 7) having a single camera (12, 14).

11. (previously presented) An analysing device as
claimed in claim 9, wherein the distance between the first and
second stations (5, 6) is substantially in the range between 1.1
and 1.2 times the distance between the second and third stations
(6, 7).

12. (currently amended) An analysing ~~devicees~~ device as
claimed in claim 11, wherein the distance between the first and
second stations (5, 6) is substantially equal to 1.15 times the
distance between the second and third stations (6, 7).

13. (previously presented) An analysing device as
claimed in claim 9, wherein the cameras (8, 9) of the station (5)
comprising two cameras are advantageously orientated in such a

way that their respective optical axes define a V with a vertex angle substantially equal to 109°.

14. (currently amended) An analyzing device as claimed in claim 9, wherein the means for driving the rollers (3, 4) in rotation comprise an endless belt (20) extending, underneath the conveyer line, along the analysing means, and arranged in such a way as to be tangential to the lower generatrix of the said rollers, and means for driving the said endless belt which are suitable for causing the latter to run at a regulable running speed which is different from that of the conveyer line.

15. (currently amended) An analysing device as claimed in claim 14, wherein the means for driving the endless belt (20) are adapted to drive it in the same direction of displacement as that of the conveyer line at an adjustable running speed which is lower than that of the said conveyer line.

16. (new) An analysing method for sorting products which are transported along an axis (x) on a conveyer line having a plurality of rollers (3, 4) which are mounted so as to each rotate freely about a transverse axis of rotation orthogonal to the axis (x), and which are spaced apart in such a way that two adjoining rollers (3, 4) define, between them, a seating for a

product, the analysing method consisting in using analysing means which are split up into a number of successive stations (5, 6, 7) arranged at a distance from one another along the axis (x), and in causing the rollers (3, 4) to revolve about their axes of rotation between the stations (5, 6, 7) in such a way as to display, at each of the stations, different faces of each product, wherein

three analysing stations (5-7) are arranged along the conveyer line, and each of the analysing stations is equipped with at least one camera (8, 9, 12, 14) which is orientated and adapted to make, with an adjustable frequency, photographs of the products transported by the conveyer line,

one of the stations (5) having two cameras (8, 9) which are arranged on either side of the conveyer line in the same vertical plane orthogonal to the axis (x), and are orientated in such a way that their respective optical axes form a V which is centred on the axis (x) and has a vertex angle substantially in the range between 90° and 130°,

the other two stations (6, 7) each comprising a camera (12, 14) which is arranged plumb with the conveyer line and is orientated in such a way that its optical axis is vertical and secant with the axis (x),

in a preliminary phase, there are determined the average diameter of the products to be analysed and, as a

function of the average diameter, a speed of rotation of the rollers (3, 4) which is adapted so that a product of average diameter which is located in the plane of a camera (8, 9) at the first station (5) and is caused to revolve on itself along the whole of the analysing means under the effect of the rotation of the rollers, undergoes a rotation such that four complementary zones on its surface are viewed by the respective cameras (8, 9, 12, 14) of the first, second and third stations (5-7),

and during the conveying of the products, the rollers (3, 4) are caused to revolve continuously at the predetermined speed of rotation, and for each product,

at least three photographs of this product are made by each camera at the first station (5), at least one photograph of this product is made by each camera at the second station (6), and at least three photographs of this product are made by each camera at the third station (7),

the theoretical diameter of this product is calculated from the photographs made, and

comparing the theoretical diameter of this product with the predetermined average diameter to determine a selection of one of the photographs made at each of the cameras of the three stations to have a set of selected photographs allowing analysis of this product's complete surface with only a given overlap of surface between any two of the selected photographs.

17. (new) An analysing method as claimed in claim 16, wherein a speed of rotation of the rollers (3, 4) is determined, which speed of rotation is adapted so that a product of average diameter undergoes a rotation on itself with an angle of rotation substantially in the range between 110° and 130° between the first and second stations (5, 6), and with an angle of rotation substantially in the range between 105° and 115° between the second and third stations (6, 7).

18. (new) An analysing method as claimed in claim 17, wherein the stations (5-7) of analysing means are arranged in such a way that the distance between the first and second stations (5, 6) is substantially in the range between 1.1 and 1.2 times the distance between the second and third stations (6, 7), and the rollers (3, 4) are caused to revolve in rotation at a constant speed of rotation along the whole of the analysing device.

19. (new) An analysing method as claimed in claim 16, wherein a speed of rotation of the rollers (3, 4) is determined which is adapted so that a product of average diameter undergoes a rotation on itself with an angle of rotation substantially equal to 125.5° between the first and second stations (5, 6), and

with an angle of rotation substantially equal to 109° between the second and the third stations (6, 7).

20. (new) An analysing method as claimed in claim 17, wherein the distance between the first and second stations (5, 6) is substantially equal to 1.15 times the distance between the second and third stations (6, 7).